PREFACE

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It is a privilege to be writing these lines to introduce the forty-sixth issue of *Advances in Applied Mechanics*. With the unfortunate passing of Hassan Aref on the 9th of September 2011, and the subsequent retirement of Erik Van der Giessen from his editorial responsibilities, this important serial found itself bereft of an editorial team. A few months later, I was invited to consider the position as editor. After careful thought, I accepted this challenging responsibility with a particular excitement but not without a certain trepidation.

The fine grain of this book series has been conscientiously chiseled by some of the most influential researchers in the field over the past 65 years. I feel extremely humbled and honoured to be trusted to sustain the fruits of years of selfless effort by the mechanics community and to be treading in the footsteps of esteemed editorial teams led by the likes of R. v. Mises, T. v. Kármán, G. Kuerti, H.L. Dryden, P. Germain, F.H. v. den Dungen, L. Howarth, J. Pérès, G.G. Chernyi, W. Olszak, W. Prager, R.F. Probstein, H. Ziegler, C.-S. Yih, J. Hutchinson and T.W. Wu, to name a few of those who have contributed to erecting the "Advances" edifice.

The idea for this serial was born before the second worldwide conflict, as early as 1940, but could only materialise, due to various setbacks, in 1948, with the first volume edited by Richard von Mises and Theodore von Kármán [3]. The original principle set forth by the first two editors was that "The book is intended for students, scholars, and engineers who are familiar with the contents of text books and handbooks but are unable to follow up all the research papers currently published in periodicals and institutional reports" [3]. The idea is that the serial should provide authoritative, didactic and self-contained reviews of a research field in which the author is "actively engaged" and has the latitude to present personal views and solutions [4].

This short forty-sixth volume is atypical because it had to be prepared within a very short timeframe. I am deeply indebted to the authors of this volume, who have demonstrated an exemplary level of commitment and responsiveness in order to adhere to the very tight schedule imposed upon them. The book is composed of two articles dealing with variational formulations. Variational formulations have clearly been essential to mechanics and to the study of materials and structures, providing rigorous mathematical grounds to the theories. *Advances* has devoted much attention to this topic. One can refer, among many others, to the survey by Biot [1] of variational-Lagrangian irreversible thermodynamics, which underlies some of the developments in the second chapter of the present volume. Variational formulations were also discussed in this serial as tools for homogenization of heterogeneous materials, e.g. in the chapter by Willis [5] on variational principles for the

Date: October 17, 2013.

homogenization of composites and in the contribution of Ponte Castañeda and Suquet [2] on the estimation of the effective behavior of nonlinear composite materials with random microstructures.

The present volume presents two cases where variational formulations of non-dissipative and dissipative problems prove particularly useful. The first chapter is concerned with mechanical models and formulations for the problem of a lipid vesicle subject to distributed forces and couples and provides two sets of methods to address this. This is a vibrant example of such cases where fundamental mechanics is able to provide insight into the behavior of biological systems, a clear trend in recent research, which the serial will continue to address in subsequent volumes. The second article tackles the problem of variational formulations for modelling coupled thermo-mechanical, nonlinear dissipative behavior, providing examples of how such variational formulations can be used to model dissipative systems. The chapter by Biot [1] can be useful reading in relation to this second chapter.

In forthcoming volumes, the serial will continue to probe mechanics of materials over a wide range of spatial and temporal scales, from a theoretical, computational and experimental viewpoint. Because these three pillars of mechanics are evolving perhaps more closely than ever before, and because of my own specialisation in computational mechanics, I will likely be seeking editorial partners from both theoretical and experimental mechanics.

I would like to conclude by thanking sincerely the authors of this volume as well as the anonymous reviewers for sharing their experience and knowledge, especially given the very short timescale available to produce this book. I am grateful to Bill Curtin for his advice and mentorship during the early stages leading to this publication. I also thank those who could not contribute at such short notice, or whose contribution could not be edited in time, but kindly offered to bring forth their contribution in the next volumes. I also extend my appreciation to the whole team at Elsevier, in particular Kate Newell and Shellie Bryant, for their professionalism.

References

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